

BAY AREA AIR QUALITY MANAGEMENT DISTRICT*PERMIT SERVICES DIVISION***Permit Evaluation and Emission Calculations**

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APPLICATION 8421	DATE 01/27/04
PROCESSING ENGINEER DENNIS T. JANG	

**Alexander Residence; Plant #15720
230 Eddy Street, San Francisco CA 94102**

BACKGROUND

The Alexander Residence is applying for an Authority to Construct and Permit to Operate for the following equipment:

- S-1 Standby Generator, Generac Model SD080, equipped with Deutz Diesel Engine, Model BF4M1013EC, 4-Cycle, turbocharged, 125 bhp

The engine model is CARB-certified per 2002 Executive Order U-R-001-0218 and its emissions performance is not based upon the use of an abatement device. Therefore, source testing will not be required.

Because the proposed engine will be located within 1000 feet of the outer boundary of a school (San Francisco Christian Academy located at 302 Eddy Street), the public notification requirements of Waters Bill are triggered. Accordingly, a notice describing the project must be sent to the parents and/or guardians of all students currently enrolled at any K-12 school located within ¼ mile of the proposed engine.

CRITERIA-POLLUTANT EMISSION SUMMARY**Annual Average Project Emissions Increase:**

Pollutant	lb/day	ton/yr
POC	0.003	0.001
NO _x	0.1	0.02
SO ₂	0.003	0.001
CO	0.05	0.008
PM ₁₀	0.004	0.001
NPOC	0	0

Daily Maximum Emissions by Source (lb/day):

Source	POC	NO _x	SO ₂	CO	PM ₁₀	NPOC
S-1 Standby Generator Diesel Engine	1.1	33.7	1.2	15.2	1.5	0

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EMISSION CALCULATIONS**S-1 Standby Generator Diesel Engine**

The proposed engine has been CARB-certified (Executive Order U-R-014-0053; 2003) at the following emission rates:

	g/kw-hr	g/bhp-hr
PM ₁₀	0.30	0.224
NO _x	6.9	5.1
CO	3.1	2.3
POC	0.21	0.16

SO₂ 0.045 lb/hr (at 0.05 wt % S, max. fuel consumption rate of 5.9 gal/hr)

$$\begin{aligned} \text{SO}_2 &= (5.9 \text{ gal/hr})(0.920)(8.34 \text{ lb/gal})(0.0005 \text{ S})(32 \text{ lb-mol SO}_2/16 \text{ lb-mol S}) \\ &= 0.045 \text{ lb/hr} \end{aligned}$$

maximum planned operation per year: 26 hr/yr
maximum engine output rating: 125 bhp (80 kw)

Annual Emissions:

$$\begin{aligned} \text{PM}_{10} &= (0.224 \text{ g/bhp-hr})(26 \text{ hr/yr})(125 \text{ bhp})(2.2 \text{ lb/1000 g}) \\ &= 1.6 \text{ lb/yr} \\ &= 0.004 \text{ lb/day} \\ &= 0.001 \text{ ton/yr} \end{aligned}$$

$$\begin{aligned} \text{NO}_x &= (5.1 \text{ g/bhp-hr})(26 \text{ hr/yr})(125 \text{ bhp})(2.2 \text{ lb/1000 g}) \\ &= 36.5 \text{ lb/yr} \\ &= 0.1 \text{ lb/day} \\ &= 0.02 \text{ ton/yr} \end{aligned}$$

$$\begin{aligned} \text{CO} &= (2.3 \text{ g/bhp-hr})(26 \text{ hr/yr})(125 \text{ bhp})(2.2 \text{ lb/1000 g}) \\ &= 16.4 \text{ lb/yr} \\ &= 0.05 \text{ lb/day} \\ &= 0.008 \text{ ton/yr} \end{aligned}$$

$$\begin{aligned} \text{POC} &= (0.16 \text{ g/bhp-hr})(26 \text{ hr/yr})(125 \text{ bhp})(2.2 \text{ lb/1000 g}) \\ &= 1.14 \text{ lb/yr} \\ &= 0.003 \text{ lb/day} \\ &= 0.001 \text{ ton/yr} \end{aligned}$$

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$$\begin{aligned} \text{SO}_2 &= (0.045 \text{ lb/hr})(26 \text{ hr/yr}) \\ &= 1.2 \text{ lb/yr} \\ &= 0.003 \text{ lb/day} \\ &= 0.001 \text{ ton/yr} \end{aligned}$$

Daily Maximum Emissions:

$$\begin{aligned} \text{PM}_{10} &= (0.224 \text{ g/bhp-hr})(24 \text{ hr/day})(125 \text{ bhp})(2.2 \text{ lb/1000 g}) \\ &= 1.5 \text{ lb/day} \end{aligned}$$

$$\begin{aligned} \text{NO}_x &= (5.1 \text{ g/bhp-hr})(24 \text{ hr/day})(125 \text{ bhp})(2.2 \text{ lb/1000 g}) \\ &= 33.7 \text{ lb/day} \end{aligned}$$

$$\begin{aligned} \text{CO} &= (2.3 \text{ g/bhp-hr})(24 \text{ hr/day})(125 \text{ bhp})(2.2 \text{ lb/1000 g}) \\ &= 15.2 \text{ lb/day} \end{aligned}$$

$$\begin{aligned} \text{POC} &= (0.16 \text{ g/bhp-hr})(24 \text{ hr/day})(125 \text{ bhp})(2.2 \text{ lb/1000 g}) \\ &= 1.1 \text{ lb/day} \end{aligned}$$

$$\begin{aligned} \text{SO}_2 &= (0.045 \text{ lb/hr})(24 \text{ hr/day}) \\ &= 1.1 \text{ lb/day} \end{aligned}$$

FACILITY CUMULATIVE INCREASE

(since April 5, 1991)

	Current		Increase		New Total	
	lb/day	ton/yr	lb/day	ton/yr	lb/day	ton/yr
POC	0	0	0.003	0.001	0.003	0.001
NO_x	0	0	0.1	0.02	0.1	0.02
SO₂	0	0	0.003	0.001	0.003	0.001
CO	0	0	0.05	0.008	0.05	0.008
NPOC	0	0	0	0	0	0
PM₁₀	0	0	0.004	0.001	0.004	0.001

TOXIC RISK SCREENING ANALYSIS

Compound	Project Annual Emission Rate (lb/yr)	Risk Screening Trigger Level (lb/yr)
Diesel particulate	1.6	0.64

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A risk screening was performed by Jane Lundquist of the District Toxics section based upon planned operation of 26 hours per year at a particulate matter emission rate of 0.224 g/bhp-hr. The results indicate that the maximum cancer risk is less than one in one million. This risk is acceptable per the District TRMP.

BACT ANALYSIS

Based upon 24-hour per day operation, the proposed S-1 Standby Generator Diesel Engine triggers the BACT requirement of NSR for NOx and CO because its potential to emit for NOx and CO exceeds 10 pounds per highest day per pollutant.

District BACT Guideline 96.1.1 (compression ignition engine < 175 bhp) specifies BACT achieved in practice for NOx as 6.9 g/bhp-hr. The proposed engine has been CARB-certified at a NOx emission rate of 5.1 g/bhp-hr and therefore satisfies BACT.

District BACT Guideline 96.1.1 (compression ignition engine < 175 bhp) specifies BACT achieved in practice for CO as 2.75 g/bhp-hr. The proposed engine has been CARB-certified at a CO emission rate of 2.3 g/bhp-hr and therefore satisfies BACT.

OFFSET ANALYSIS

Because the facility POC and NOx emissions (including proposed S-1 emission increases) will each not exceed 15 tons per year, the offset provision of NSR for those pollutants (Regulation 2-2-302) does not apply. According to the District data bank emission inventory (see "emitlook"), the current facility POC and NOx emissions are zero.

Because the Alexander Residence is not a major facility for SO₂ or PM₁₀, the offset provision of NSR for those pollutants (Regulation 2-2-303) does not apply.

FEE SUMMARY

Source	Fee Schedule	Filing Fee	Initial Fee	Late Fee	Permit to Operate Fee	Source Sub-Total
S-1 Standby Generator	B	\$254.00	\$358.00	\$0.00	\$141.00	\$753.00
Grand Total						\$753.00
Amount Paid						\$753.00
Log Number						J370J

STATEMENT OF COMPLIANCE

The proposed **S-1 Standby Generator Diesel Engine** is liquid-fuel fired and therefore is not subject to Regulation 9, Rule 8. The engine is subject to the SO₂ limitations of 9-1-301 (ground-level concentration) and 9-1-304 (0.5% by weight). Compliance with both of these

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requirements is considered very likely since diesel fuel with a 0.15% by weight sulfur is mandated for use in California.

This project is considered to be **ministerial** under the District's CEQA Regulation 2-1-311 and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emission factors as outlined in the District Permit Handbook (**chapter 2.3, Internal Combustion Engines**) and therefore is not considered discretionary as defined by CEQA.

The Alexander Residence is located within 1000 feet of the outer boundary of a K-12 school (San Francisco Christian Academy) and is therefore subject to the public notification requirements of Regulation 2-1-412. Accordingly, a notice describing the project must be sent to the parents and/or guardians of all students currently enrolled at any K-12 school located within ¼ mile of the proposed engine.

A Toxics Risk Screening Analysis was performed by Jane Lundquist of the District Toxics Section to determine the increased cancer risk resulting from the emission of diesel exhaust particulate from the proposed engine base upon 26 hours of planned operation per year. The resulting cancer risk was estimated to be less than one in one million. This level of risk is acceptable per the District TRMP.

Offsets, PSD, NSPS, and NESHAPS do not apply to this project.

PERMIT CONDITIONS

Conditions for S-1

- 1) The S-1 Diesel engine is subject to the requirements of Regulation 9, Rule 1 ("Sulfur Dioxide"), and the requirements of Regulation 6 ("Particulate and Visible Emissions"). These engines may be subject to other District regulations, including Regulation 9, Rule 8 ("NOx and CO from Stationary Internal Combustion Engines") in the future. [basis: Regulation 9, Rule 1; Regulation 6]**
- 2) The owner/operator of S-1 Diesel Engine shall ensure that the engine is operated for no more than a total of 26 hours in any calendar year for the purpose of reliability-related activities as defined in Regulation 9-8-232. [basis: TRMP, Regulation 9-8-330.2]**
- 3) The S-1 Diesel Engine may be operated for an unlimited amount of time for the purpose of emergency use as defined in Regulation 9-8-231. [basis: Regulation 9-8-330.1]**
- 4) The owner/operator shall ensure that S-1 Diesel Engine is equipped with a non-resettable totalizing counter which records hours of operation for each engine. [basis: Recordkeeping]**

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- 5) **The owner/operator of S-1 shall maintain the following records on a monthly basis in a District-approved log. These records shall be retained on site for a minimum of 2 years from the date of entry and made available to the District upon request.**
- a) **hours of operation for reliability-related activities for S-1 Diesel Engine and a description of the nature of the reliability-related activity**
 - b) **hours of operation under emergency conditions for S-1 Diesel Engine and a description of the nature of the emergency condition**
- [basis: Recordkeeping]

RECOMMENDATION

Issue a **conditional Permit to Operate** for the following source:

S-1 Standby Generator, Generac Model SD080, equipped with Deutz Diesel Engine, Model BF4M1013EC, 4-Cycle, turbocharged, 125 bhp

EXEMPT SOURCES

None

Air Quality Engineer II

Date